

Physical activity correlates of overweight and obesity in school-going children of Dehradun, Uttarakhand

Madhavi Bhargava¹, S. D. Kandpal², Pradeep Aggarwal²

¹Department of Community Medicine, Yenepoya Medical College, Yenepoya University, Mangalore, Karnataka, ²Department of Community Medicine, Himalayan Institute of Medical Sciences, SRH University, Dehradun, Uttarakhand, India

ABSTRACT

Background: Physical activity is important for prevention of overweight and obesity in growing children. **Objective:** The present study aims to explore the association of overweight and obesity in school children of the district of Dehradun with physical activity, sports, and recreation at home and school. **Materials and Methods:** A cross-sectional survey of 1266 schoolchildren of select private and government schools in urban and rural areas was done. **Results:** Overall 15.6% of children were overweight, of which 5.4% were obese. Overweight and obesity were significantly associated with physical inactivity related to passive transport to school, missed opportunities for play during lunch breaks, lack of participation in household work, and excessive viewing of television. **Conclusion:** We found a significant association between the lack of physical activity and overweight and obesity. There is a need to enhance physical activity, sports, and recreational opportunities at school as well as home to prevent overweight and obesity in children. Family physicians should include counseling for this important and cheap modifiable risk factor in their family care practice.

Keywords: Exercise, obesity, overweight, sports and recreation, television

Introduction

Nutrition transition is now a well-known phenomenon in developing countries with increasing overweight and obesity across age groups due to a shift in diet and physical activity factors.^[1] People who are not sufficiently physically active are at about 20–30% greater risk of all-cause mortality compared to those who are involved in at least 30 min of a moderate amount of physical activity on most week days. Approximately 3.2 million deaths annually are attributable to insufficient physical activity.^[2] Obesity and resultant noncommunicable diseases in adulthood can be prevented by inculcating physical activity habits in childhood. School-based physical activity interventions show consistent improvement in knowledge, attitudes, behavior and when tested, physical and clinical outcomes.^[3] Schools can stimulate

this by necessary recreational facilities, physical infrastructure, and equipment.^[4] All schools should include a physical activity component taught by trained teachers in a supportive environment. Moreover, many environmental factors reduce opportunities for safe physical activity.^[5] Parents prefer that the children are driven to their schools rather than allowing them active transport like walking or cycling due to safety reasons. Physical activity habits developed during school years can go a long way later in life and contribute in amelioration of noncommunicable disease burden at national and international level.

The problem of overweight and obesity due to reduced physical activity is often referred to as a result of “westernization” which includes increasing use of electronic goods and screen time and changing consumer and dietary pattern. A recent study in private and government schools in Delhi has highlighted the factors such as “westernization” and nutrition, physical activity, and dietary behaviors.^[6] Uttarakhand is a young state with widespread

Address for correspondence: Dr. Madhavi Bhargava, Department of Community Medicine, Yenepoya Medical College, University Road, Deralakatte, Mangalore - 575 018, Karnataka, India.
E-mail: madhavibhargava4@gmail.com

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/2249-4863.197281

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Bhargava M, Kandpal SD, Aggarwal P. Physical activity correlates of overweight and obesity in school-going children of Dehradun, Uttarakhand. J Family Med Prim Care 2016;5:564-8.

developmental activities and is not exempt from acculturation that is spreading in the country. The objective of this study was to study the physical activity factors associated with overweight and obesity in urban and rural school-going children belonging to high- and low-income groups.

Materials and Methods

This was an observational cross-sectional study conducted during the year 2013, in the district of Dehradun of the North Indian state of Uttarakhand. Data were collected from school children aged 6–17 years in government and private schools in urban and rural areas of the district. For socioeconomic status, the government schools represented the low-income group and the private schools represented the high-income group.

Sampling method

A total of 1266 children from class 1 to 12 were enrolled from multiple schools in urban and rural schools of government and the private sector. Each class had multiple sections and one section from these was included by simple random sampling. All children present on the day of the survey were enrolled after excluding those who were differently abled. Age of a child was determined using the date of birth in school register. A prior written consent was taken from parents, and verbal assent was taken from the children after detailed explanation. The study was approved by the ethics committee of the Himalayan Institute of Medical Sciences.

Anthropometry

Weight was recorded using the digital weighing machine (Omron Model: HN286, accuracy 0.1 kg) and height was measured using a wall-mounted staturimeter (Seca body meter 206, accuracy 0.001 m). Both height and weight were taken using the standard measures recommended by the World Health Organization (WHO).^[7] These cut-offs are appropriate for developed as well as developing countries.

Study instrument

The data collection tool used was an interview schedule developed after an informal visit to nearby government and private school for patterns of physical activity as well as interaction with school-going children. It was initially framed in the English language, translated to Hindi, and retranslated to English to check for any change in content and message. This tool was then pretested in some nonparticipating school-going children followed by necessary modifications. The level of physical activity was assessed with questions regarding locally relevant sports and household chores, television viewing, and computer usage. Students were asked about the mode of transport to school, leisure time, and lunch time activities at school and whether academic routine leaves time to have postschool playtime. At the end of the questionnaire completion, anthropometric measurements were made, and a physical survey of the schools was done to assess the availability of sports material and facilities for recreation.

Statistical analysis

Nutritional status was defined using the WHO cut-offs^[8] and statistical analysis was performed using SPSS (IBM SPSS Statistics Version 19). Categorical variables tested using Chi-square test and the value of $P < 0.05$ considered statistically significant.

Results

Table 1 shows the distribution of study participants in all the types of schools. Children in all age groups and gender were nearly evenly distributed. The overall mean body mass index (BMI)-for-age z-score (BAZ) was -0.47 . The prevalence of overweight and obesity, i.e., $BAZ > +1$ standard deviation was 15.6% of which 5.4% were obese. Passive transport to school, lack of active play during lunch breaks in school and limited after-school physical activity were strongly associated with overweight and obesity [Table 2 and Figure 1]. A surprising fact that needs to be highlighted is that only 17% of government school children reported the availability of sports material within the school. On the other hand, all the private schools had sports material, playground, and recreation infrastructure (parallel bars, slides, net for badminton, etc.) for physical activity. These figures did not reflect on the burden of overweight and obesity in these school types. Interestingly, the private schools had rules and regulations that prevented kids from having unstructured lunch time activities (children sit during lunch breaks in their respective classrooms to avoid littering). Moreover, private schools allotted very limited time for physical activity. On the other hand, the government schools were found to be lacking in physical activity infrastructure, but even small playgrounds were being used by the children for unstructured playing and physical activity during lunch break and during school hours. Greater proportion of students from the private schools felt academic stress to the extent which prevented them from pursuing postschool outdoor activities (51% vs. 17%; $P < 0.001$). This in turn was associated significantly with overweight and obesity.

Table 1: Characteristics of study participants

Type of school	Age group (years)	Boys (n=616)	Girls (650)
Urban private (n=312)	6-8.9	50 (30.3)	46 (31.3)
	9-11.9	47 (28.5)	34 (23.1)
	12-14.9	39 (23.6)	35 (23.8)
	15-17	29 (17.6)	32 (21.8)
Urban government (n=320)	6-8.9	41 (28.1)	43 (24.7)
	9-11.9	48 (32.9)	50 (28.7)
	12-14.9	35 (24.0)	45 (25.9)
Rural private (n=317)	6-8.9	22 (15.1)	36 (20.7)
	9-11.9	51 (30.9)	40 (26.3)
	12-14.9	45 (27.3)	34 (22.4)
	15-17	38 (23.0)	44 (28.9)
Rural government (n=317)	6-8.9	31 (18.8)	34 (22.4)
	9-11.9	45 (32.1)	50 (28.2)
	12-14.9	36 (25.7)	40 (22.6)
	15-17	36 (25.7)	59 (33.3)
	15-17	23 (16.4)	28 (15.8)

Figures in parenthesis indicate percentages

Table 2: Physical activity correlates of overweight and obesity in study participants

Variable	Categories	Not overweight (BAZ < +1 SD) (n=1069)	Overweight (BAZ > +1 SD) (n=197)	P (Chi-square test)
Mode of transport to school*	Active	643 (94.3)	39 (5.7)	<0.001
	Passive	426 (72.9)	158 (27.1)	
Allowed to play in lunch break in school	Yes	933 (87.7)	131 (12.3)	<0.001
	No	136 (67.3)	66 (32.7)	
Activities in lunch break	Sit and talk	336 (82.2)	73 (17.8)	0.014
	Walk with friends	272 (81.7)	61 (18.3)	
	Play actively	461 (88.0)	63 (12.0)	
Postschool physical activity and sports	Yes	458 (84.8)	82 (15.2)	0.025
	>3 times/week	57 (89.1)	7 (10.9)	
	<3 times/week	213 (78.9)	57 (21.1)	
Watch television atleast 3 times/week	≤1 h/day	612 (86.1)	99 (13.9)	0.041
	>1 h/day	457 (82.3)	98 (17.7)	
Use computer at least 3 times/week	Yes	325 (72.1)	126 (27.9)	<0.001
	No	744 (91.3)	71 (8.7)	
Play ground near house for recreation	Yes	686 (84.4)	126 (15.6)	0.523
	No	386 (84.5)	71 (15.5)	
School routine allows enough time to play	Yes	728 (87.1)	108 (12.9)	<0.001
	No	341 (79.3)	89 (20.7)	
Help in household work#	Yes	572 (89.5)	67 (10.5)	<0.001
	No	257 (77.4)	75 (22.6)	
	Sometimes	240 (81.4)	55 (18.6)	
Eat while watching television	Yes	834 (83.7)	162 (16.3)	0.107
	No	235 (87.0)	35 (13.0)	

Figures in parenthesis indicate percentages; *Active transport includes walking or bicycle; #Household work here includes sweeping, mopping, fetching water from distance, manually washing clothes, washing utensils, cutting grass, etc., BAZ: BMI-for-age Z-score; SD: Standard deviation; BMI: Body mass index

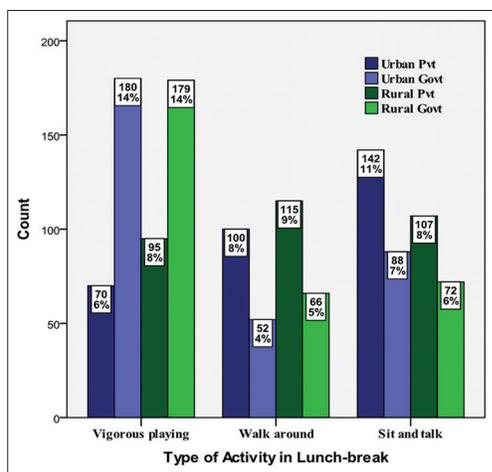


Figure 1: Lunch-break activity of study participants in school

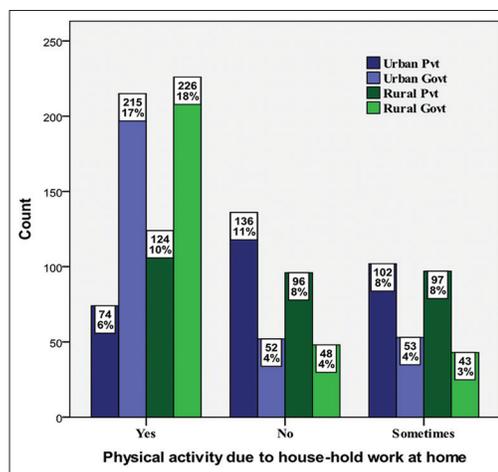


Figure 2: Physical activity due to house-hold work in study participants

More government school children were involved in helping with the household chores as compared to those from private schools [Figure 2]. There was also a significant association between lack of involvement in household activities and overweight and obesity [Table 2]. A large number of rural children were involved in post-school farm related activities. While television viewing and increasing computer usage were associated with the problem in question, the absence of a playground near the house and the habit of eating while watching television were not significantly associated.

Discussion

Limited exploration has been done in India regarding all the physical activity factors in schoolchildren in India. Factors that are often studied are hours of physical activity and television viewing.^[9,10] The Calcutta obesity study has studied the individual sport, time spent in each of these and its correlation with body composition.^[11]

Schools and academic pressures play an important role in physical activity attitudes of the children. Moreover, the transition from

agrarian lifestyle, changing economic status, invasion of television and computer across communities have greatly contributed to the prevalence of overweight and obesity. This especially affects younger age-groups which are quick in picking up attractive options and show disinclination toward traditional lifestyle and physical activity. While this is well documented in large cities,^[6] the changes in rural and less urban locations are less explored. A recent study in Karnataka used photo journals to understand this and found children to be interested in active pastimes as well.^[12]

Schools play a very important role in improving physical activity habits in children in their formative years. Providing unstructured leisure time which encourages physical activity and recreation during or after school should be given equal emphasis as academics. While this is particularly important for private schools, government schools (which cater to low-income groups) lacking in physical infrastructure need the material support of the state for improvement. A 5-year multi-intervention program, SYS-KEM study was conducted in Pune and Nasik, which covered physical activity, diet, and general health domains in schoolchildren.^[13] Apart from extra and intra-curricular physical activity sessions, there were yoga-based breathing exercises, changes in school meals and nutrition education of teachers, students and families in the intervention group. While there was no impact on the children's BMI, the waist circumference was lower in the intervention group.

Guidelines for physical activity which are applicable to ever increasing a number of private schools which give too much stress on academic performance, leaving little room for after-school physical activity also need to be framed and implemented. Significant gaps in the understanding of overweight and obesity in children, role of schools, academic pressures from school, and parents prevail. Multicentric studies that address all these factors in urban-rural schools and all income groups are required. This will contribute in creating evidence for school-health policies and implement balanced curriculum that is healthful for children.

Limitations of the study

The study design is cross-sectional in nature, hence no causal association can be inferred. Moreover, for young and middle-aged adults a standardized and validated tool like the International Physical Activity Questionnaire is available.^[14] Since no such standardized tool is available for the age group included in the study population, the findings cannot be generalized or compared with other parts of India.

Strengths of the study

This study encompasses government and private schools in rural and urban India. This facilitates the assessment and comparison of physical activity correlates across school types. Published literature so far does not report physical activity factors in schoolchildren of Uttarakhand and their role in overweight and obesity in this age group.

Conclusion

This study found a significant association between the lack of physical activity and overweight and obesity in school-going children. There is a need to enhance physical activity, sports, and recreational opportunities at school as well as home to prevent overweight and obesity in children. These will be important primary prevention measures to combat the epidemic of non-communicable diseases in India.

Role of primary care physicians

Primary care and family physicians are in a unique position where they deal with families across their life-course. Noncommunicable diseases in an adult have their origin in the childhood. Any patient with noncommunicable disease is an opportunity to provide holistic care that encompasses all the modifiable risk factors in the family of patient rather than a patient being treated as an island.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Popkin BM, Adair LS, Ng SW. Global nutrition transition and the pandemic of obesity in developing countries. *Nutr Rev* 2012;70:3-21.
2. World Health Organization. Global Recommendations on Physical Activity for Health. Geneva, Switzerland: World Health Organization; 2010.
3. Alwan A. Global Status Report on Noncommunicable Diseases 2010. Geneva: World Health Organization; 2011.
4. World Health Organization. Global Strategy on Diet, Physical Activity and Health, Geneva, Switzerland: World Health Organization; 2004.
5. Sahoo K, Sahoo B, Choudhury AK, Sofi NY, Kumar R, Bhadoria AS. Childhood obesity: Causes and consequences. *J Family Med Prim Care* 2015;4:187-92.
6. Harrell M, Ussery E, Greene-Cramer B, Ranjit N, Sharma SV. The influence of "westernization" on nutrition and physical activity behaviors of adolescents in New Delhi, India: Are we exporting an epidemic of obesity? *J Appl Res Child* 2016;6:10.
7. Physical status: The use and interpretation of anthropometry. Report of a WHO Expert Committee. *World Health Organ Tech Rep Ser* 1995;854:1-452.
8. de Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. *Bull World Health Organ* 2007;85:660-7.
9. Kotian MS, Kumar SG, Kotian SS. Prevalence and determinants of overweight and obesity among adolescent school children of South Karnataka, India. *Indian J Community Med* 2010;35:176-8.
10. Goyal RK, Shah VN, Saboo BD, Phatak SR, Shah NN, Gohel MC, *et al.* Prevalence of overweight and obesity in

- Indian adolescent school going children: Its relationship with socioeconomic status and associated lifestyle factors. *J Assoc Physicians India* 2010;58:151-8.
11. Ghosh A. Association of anthropometric, body composition and physiological measures with physical activity level among the children and adolescents of Asian Indian origin: The Calcutta obesity study. *J Nutr Health Aging* 2010;14:731-5.
 12. Staab EM, Cunningham SA, Thorpe S, Patil SS. A "snapshot" of physical activity and food habits among private school children in India. *Childhood*. 2016:0907568215625758.
 13. Bhave S, Pandit A, Yeravdekar R, Madkaikar V, Chinchwade T, Shaikh N, *et al.* Effectiveness of a 5-year school-based intervention programme to reduce adiposity and improve fitness and lifestyle in Indian children; the SYM-KEM study. *Arch Dis Child* 2016;101:33-41.
 14. Booth ML, Ainsworth BE, Pratt MI, Ekelund U, Yngve AG, Sallis JF, *et al.* International physical activity questionnaire: 12-country reliability and validity. *Med sci sports Exerc*. 2003;195(9131/03):3508-1381.